Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

veloped in terms of the total proper-motion, radial velocity and parallax, it is possible, from a knowledge of three of these quantities, to derive the fourth. For the radial velocity only two definite determinations exist, *viz.*, — 94 km. (Mount Wilson) and — 128 km. (Lick), which gives for the weighted mean — 117 km./sec. with an error probably not exceeding 20 km. With this value and the adopted parallax value of $0''.55 \mp ''.01$ we compute the secular change in proper-motion at $0''.00068 \mp ''.00012$.

1922 March 3.

Knut Lundmark,
Willem J. Luyten.

On the Color of the Stars

The data collected from the *Henry Draper Catalogue of Stellar Spectra* by Dr. Harlow Shapley and Miss Cannon and published in *H. C.* **226** afford excellent material for a study of the color of the stars.

By means of the values of the color-index for the different spectral classes given in *H. A.* **80**, 151, the mean color-index was derived for each of the 8 groups of stars of different magnitude in *H. C.* **226**, Table I. For the division of the brighter stars into groups with half-magnitude intervals, *H. A.* **50** was used. As the system of spectral classification in *H. A.* **50** is not the same as in the *Henry Draper Catalogue* (e. g., in *H. A.* **50** there are 1,549 A0, 325 A2 and A3, 1,302 K0 stars brighter than $6^m.25$, in the *H. D.* 736, 728 and 1,310 respectively), a systematic correction of $+ 0^m.025$ was applied to the *H. A.* **50** values. This correction was deduced from the fact that the mean color-index of all stars brighter than $6^m.25$ visually was $0^m.423$ in *H. A.* **50** and $0^m.448$ in *H. C.* **226**.

Throughout the investigation stars of classes P, O, Md, N and R have been omitted, since they are not included in the tables in *H. C.* **226**, which omission may tend to decrease slightly the slope of the color-index-magnitude curve.

The values for the mean color-index for each interval of half a magnitude are tabulated below. From left to right the different columns of the table give: the limits of magnitude, the mean color-index, Ic, in thousandths of a magnitude, the number of stars in each interval and the ratio of each of these figures into the previous one. The results are plotted in Figure 1 below, which shows a remarkably steady increase of color-index between second and fourth magnitude and a sudden drop at $4^{m}.5$.

TABLE I.

MAG. LIMITS	MEAN Ic	NO. OF STARS	RATIO	MAG. LIMITS	MEAN Ic	NO. OF STARS	RATIO
	$0^{m}.312$	9	——	$5^{m}.25$			
$0^{m}.75$					$0^{m}.406$	1505	1.64
	0 .381	20	2.22	5 .75			
1 .75					0 .459	2705	1.80
	0 .317	32	1.60	6 .25			
2 .25					0 .487	4622	1.71
	0 .381	39	1.22	6 .75			
2 .75					0 .502	8186	1.75
	0 .440	93	2.38	7 .25			
3 .25					0 .553	12721	1.58
	0 .483	136	1.46	7 .75			
3 .75					0 .567	26384	2.07
	0 .526	266	1.96	8 .25			
4 .25					0 .552	40167	1.52
	0 .441	489	1.84	8 .75			
4 .75					0 .536	47742	1.19
	0 .464	917	1.88	9 .25			
5 .25					0 .474	76153	1.60
				All Stars	0 .473	222186	——

This, however, may not have any real significance, as the number of stars between the second and fourth magnitude is very small. The main conclusion, therefore, that we can draw from the foregoing data is the well-known fact that the mean color-index increases when the apparent magnitude decreases, or in other words that the dwarfs play a more prominent part among the apparently fainter than among the brighter stars. It would be interesting to see what the relation between galactic latitude and the change of color-index with apparent magnitude is, but as yet no separate data for the different galactic latitudes are available.

The figure also bears some evidence in regard to the completeness of the *Henry Draper Catalogue.* From the drop in color-index after $8^{m}.5$ we may safely conclude that the *H. D. Catalogue* begins to be incomplete for late-type stars below $8^{m}.75$,, although there is some indication that the very red stars begin to drop off as early as $8^{m}.25$. This is not supported, how-

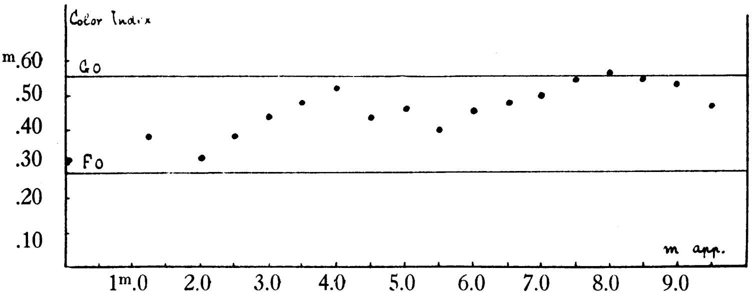

FIG. 1

ever, by the number of stars in each group, as is shown by the ratio r of the number of stars in any interval to that of the previous one. The theoretical value of r is 1.995. The small ratio at $8^{m}.5$ is fully explained by the previous large one, as is also the case with the ratios in the vicinity of the second and third magnitude.

For comparison the relation between color-index and absolute magnitude is represented in Figure 2, the material for which was collected from *Mount Wilson Contributions* **199**, extrapolated for early-type stars by means of data derived from proper motions.

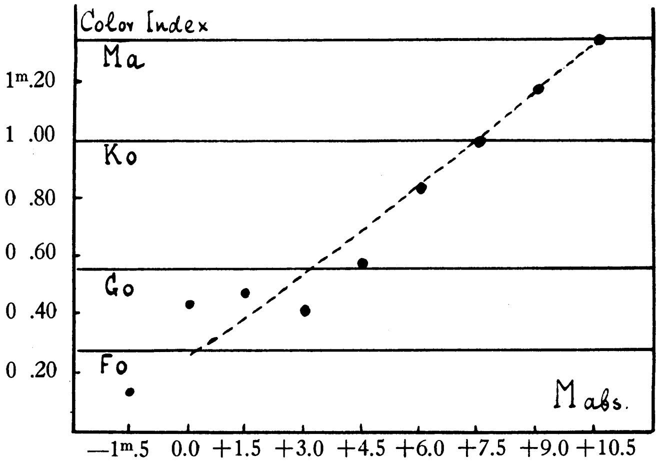

FIG. 2

A mean color-index of $0^{m}.56$, equal to that of a star of class G0 is reached at apparent magnitude $8^{m}.0$ and absolute magnitude $3^m.0$, thus yielding a mean value of $0''.0100$ for the parallax of an eighth magnitude star. According to Kapteyn's formula $\bar{\pi} = 0''.0158 \cdot (0.78)^{m-5.5}$ the mean parallax for a star of visual magnitude $8^m.0$ is $0''.0085$. Although the agreement is very close, we must not overestimate its weight, on account of the uncertainty of the color-index for the stars with high luminosity. If, for instance, we disregard the first three dots in figure 2, we can, without straining the figures, arrive at a color-index of $0^m.56$ for $M = 3^m.8$, corresponding to a parallax of $0''.0144$ or 70% more than Kapteyn's value. A color-index of $0^m.28$ (F0) might be reached at $m = 1^m.0$ and $M = 0^m.0$ giving a mean parallax of $0''.063$ for a first magnitude star, whereas Kapteyn finds $0''.048$.

1922, January 3. WILLEM J. LUYTEN.

REMARKS ON H. D. CURTIS' PAPER ON STELLAR LUMINOSITIES

The interesting paper by Heber D. Curtis[1] in the last number of this journal, with its excellent material of absolute magnitudes, suggests a few comments. First, it may be pointed out that the well-known relative scarcity of F and early G giants is even more striking when compared with the excess of "super-giants" of these classes (spectroscopic absolute magnitudes for *Cepheids*). This tends to make the diagram look as if the distribution of absolute magnitudes follows two parallel lines. The higher one of these two lines may link up with the B-supergiants, such as *β Orionis, α Crucis,* and the Walf-Rayet stars, to some of which Lundmark[2] assigns absolute magnitudes of $-4^m.0$.

In connection with the probable parallaxes of a $9^m.5$ star, which Curtis derives on page 38 of his paper, it may be remarked that, although in space the dwarfs greatly outnumber the giants. this may not be applied when dealing with stars of the same apparent magnitude. If we take the number of giants to be only 1% of the total, and assume the mean absolute magnitudes of giants and dwarfs to be $+0^m.8$ and $+6^m.0$ respectively (which holds for the K-stars), both with a Gaussian distribution, then

---

[1] *Publ. A. S. P.* **34**, 33, 1922.
[2] *Publ. A. S. P.* **34**, 40, 1922.